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ABSTRACT

The aim of this study was to explore the aesthetic impact of a literary text on the human mind and to extend the knowledge on how and when the information from a book enters the human brain, and if and when it starts to be processed and, possibly, memorized. Readers' responses to aesthetic texts were measured through a series of biometric laboratory tests, which included a general readability test, a decision selection test, basic media tests, a general processing test, a stress wave test, and a reaction test. Basic equipment used included a sensoric tracking device, a cortical response processing device, and a peripheral responses processing device. Within the test group were people of different age, sex, nationality, and linguistic competence and education. In general, the findings showed great differences between the perception, enjoyment, and retention of the same texts by different persons--far more than may be attributed to the subjects' backgrounds or competencies. Furthermore, the isolation of "pure" aesthetic impact was inhibited by the fact that nearly all the subjects understood the term "aesthetic" in different terms. Finally, the same text read and understood by several readers produced very different retrieval/memory/responses. Seventy-two references are listed. (Author/LLS)

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Dr. M. F. Malik

AESTHETICAL INFORMATION IMPACT OF A LITERARY TEXT

Montreal, September 1979

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Introduction to chapters VI and VII

The method of esthetic evaluation outlined above by Dushan Bresky is a humanist synthesis of objective analytical approaches to literary texts with a knowledgeable empirical subjective appraisal of their esthetic intensity.

In the near future, the current biocybernetic measurement of esthetic (Information) impact of literary texts may help to elucidate the function and undeniable value of the subjective criticism. The first scientific attempts to explore individual psychophysiologies responses triggered by literature have begun in the United States, Russia, Japan, Germany and Canada. So far, we are only aware of a few methodologies; new equipment and techniques continue to be developed. As a result of this research esthetics may gradually become a new meeting ground of humanism and science.

In a number of informal discussions the two writers of this volume realized the closeness of their scholarly goals, i.e., a through investigation of esthetic values and of esthetic stimuli. They agreed on twinning their seemingly heterogenous scholarly projects with a hope that it may be a legitimate contribution to seminal research in perception esthetics and in literary criticism in particular. At the present stage of the biometric methods, it would be absurd to set the impossible goal of "reading the mind." but any extension of knowledge on how and when the information from a book enters the human brain, if and when it starts to be processed, and later possibly memorized is a valuable investigation of subtle and intangible values such as experience of "beauty", "love", "justice", "freedom", "joy", values which we all share and treasure as the ultimate goal of our work and life.

The subsequent account on biometric measurements of the responses to the texts first analyzed by the humanist is one of the first precedents of future collaboration between applied science and literary ciritcism. It forms a relevant appendix to the discussion on esthetic stimulation, on the role of imagination, on the nature of specific esthetic stimuli and on their relative intensity within a given micro-context.

The method of tracing the reader's responses to esthetic texts consists of the series of biometric laboratory tests. They do not follow the exact order and hierarchy of the values and categories of literary criticism, simply because some of these are not the same, when we enter the area of human brain. We all may share the understanding of experiences such as "beauty", "love", "justice", "freedom" etc., but the appearances intensities, even a mechanisms of retrieval of these will be by the different persons - different.

From the biometric tests we may only conclude, that such or similar processes had begun in the individual's brain, or that texts revoke some responses which are obvious or accompany the statement of such values by measured person.

Five basic biometric tests are used on the tested persons, in the following order:

1. General Readability Test /GRT/: assessing input of information in the reader's brain. This means, that we investigate, if text is fully or partially intercepted by eye and carried into the visual cortex of brain as chemoelectrical potentials.

2. Decision/Selection Test /DS/: locating the possible "domains", or parts of the text, which are carried into the brain with higher or preferent intensity of signal - and, in negative sense, other parts of the text, which are overlooked, missed or skimmed over by the reader.

3. Formal Test Group /ST, MT, CT/: asessing possible specific impact of printed media, or characteristics, inherent to the form, time and environment of reading process.

4. Stress Wave Test /SWT/: assessing possible beginning and development of wave characteristic in the brain cortex, which is loosely connected to the term "emotions", "emotional thinking".

5. Retrieval Test /RT/: investigating the parts of text, easily or prefentially retrieved from the memory of the reader.

Naturally, it was not practical to record responses to long integral texts such as novels or plays. For this reason Bresky selected typical short texts such as well known poems or fragments of prose. Relating e.g., a significant event, conflict, comical or erotic features, bizarre, s pernatural element. The selections included samples whose esthetic density the critic considered either relatively high or relatively low.

Among the readers participating in the measurement were some students and staff of the University of Concordia and the author of the previous five chapters.

Within the test person group were people of different age, sex, nationality, or linguistic competence and education. In general, research performed showedgreat differences between the perception, enjoyment and retention of the same texts by different persons - far more, that we may attribute to their backgrounds or competencies.

Furthermore, the isolation of "pure" aesthetic impact was inhibited by the fact, that nearly each person had understood the term "aesthetic" in the different terms or approaches. Therefore, in following text there are explained at least four basic approaches to the aesthetic as understood by research group.

Finally, the same text read and understood by several readers had produced very different retrieval/memory/responses. As we all have different memory characteristics, this fact influenced greatly the evaluative hierarchy of each reader, when control questions battery was asked.

As digressive as it may seem before reporting and interpreting the results of specific tests it may be helpful especially from the point of view of the lay reader to discuss their general criteria and premises. The most important among these criteria are the concept of text from the point of view of biometric measurements; the perception of the textual stimuli to the brain and the nature of esthetic response to the transmitted literary material.

A more general discussion on these criteria offers a suitable overture to the specific results of biometric measurements.

Dr. M. F. Malik:

Aesthetic Information Impact of a Literary Text

Introduction

This is an attempt to analyse the aesthetic information impact of a literary text. It follows and is applied to current discoveries in the disciplines of biocybernetics, system and information theories, neuro- and psychophysiology.

The analysis is based on the:

- information impact of a literary text on human mind
- aesthetic impact of a literary text and tries to construct an
- aesthetic information profile of a literary text.

Any literary text is seen here as a matrix of coded sensoric stimuli, which are catalysts for subsequent activity in the cortical and subcortical regions of the human brain. The interference and pattern nature of the human cortex permits vastly different and simultaneous decoding, processing and storages of the same literary text and can cause unbelievably broad and far-reaching reflections, subsequent behavior or later storages and retrievals (memories) in the brain.

The investigation of the aesthetic information impact presently being done by various experimental psychological methodologies seems to be unsatisfactory. Any question asked, any verbal or graphic record retrieved from the reader, is full of biases, especially during the retrieval period when the nature of the question, interviewer, interviewing situation, and many other factors alter the original aesthetic information impact of the text. Moreover, the information already stored in the reader's brian greatly influences the text's impact. The research indicates that in a very few seconds of

time, the incoming information from the text merges in a sea of other impulses, activities and processes not connected to the text at all. The result is always of a cumulative nature.

In the level of the brain's cortex, words, sentences or literary texts really do not exist as entities. Thanks to our inborn and accumulated abilities, the human brain encodes and decodes the verbal text into larger information clusters - patterns and matrixes which sometimes correspond to whole situations, actions, chapters or a whole book. A writer's artistry substantially helps to shape such a pattern, yet it is very difficult for the writer or the layman to visualize. It has substantial electorchemical characteristics and sometimes we call it the temporal neural pathway. This area is close to the notion of the semantic or content impact of a literary text.

While the text is perceived, several processes cued to the structure and form of the text take place. The writer's artistry in this field shapes the surroundings, encompassing the neural pathway (in this way we may say that the content of a book is the information carrier of the formal elements), and is usually fixed in the borders of the neural pathways. In these borders of neural pathways lie the source for later reflection of the state which we call "aesthetic" feelings, appreciations, values. So it is understandable that the content (carrier) and form of literary work are closely parallel - in the reader's mind as in the text.

The methodology of the experimental research described here is largely neurophysiological. It is called "biometric" because what is measured are variations of energy states in parts of the human body, namely in the brain. This corresponds to the basic notion of information as an energetic process. It is much more precise to measure the impact of a text by electrodes than by asking a reader a question. But it is much more difficult to interpret the biometric potential than the reader's opinion on whether he "likes" or

"dislikes" a particular feature of a literary text. And it's very difficult in biometry to generalize the findings extracted from many readers. As the brain speaks, we are as different from each other as are the species of the animal world.

The generalization starts to bear higher than arithmatic assumptions if one wishes to quantify the impacts of literary text. Digital-analog processing of data, Fourrier and 3D analysis of it, interference (holographic) representation become useful tools of data diagnosis.

The reader should read the following pages with the understanding that the subject of analysis ("literary text") has no direct comparison or reflection in the human brain and when we try to relate neurological processes to the printed page, there may be a very different law of order govering each one.

But still, people read books and understand them commonly and can communicate about them. Let's see how, within what frame and with which kinds of biases or remarkably educated guesses such processes happen.

Information Impact of Literary Texts on the Human Mind

Information in a literary text, does not mean memorized, stored, cognitive (content) or formal units but any distinguishable part of the text causing neural energetic change with catalytic characteristics. In the human world, information does not exist in isolation, but moves within specific structures, called information chains, matrixes and patterns. In a simple scheme, every information chain has three components and stages: Information source (text, book, performed speech): transmission conditions (place and time in which a text or books is read, heard or otherwise perceived; receiver and his responses (readers and their corresponding states of mind vis-a-vis the materials read).

If any part of the information chain is changed, the information itself is slightly or considerably changed. For a long time it was believed that an information source in itself contained all the esthetic information impact and nothing could change it. Writers and typographers invented countless aids to greatest retention of words, forms, layout and supporting illustrations. Now we know that the text carries only a certain amount of information, the stimuli most capable of starting the catalytic process in the human brain's cortex . Some types of literary texts have carefully designed stimuli, worked out by the writer up to the last possible detail; others count on free associations of the readers (poems), and still others involve the readers in psychodramatic ways (fictional and detective stories). Generally, according to information system theory, texts may contain various degrees and quantities of functional (logistic), perceptual and stress characteristics, reflected in reader's subsequent behaviour - latent or pronounced. (Functional or logistic

characteristics are mostly contained in the content, story or plot of the book; perceptual characteristics are mostly found in descriptions of places, persons or actions; stress characteristics are often associated with emotional scenes, dialogues or descriptions).

The degree of information contained in an information source is occasionally reflected in literary criticism as programmed, hearing content fictional literature (high degree of information at source), or formalist, stylistic or poetic literature (low degree of information at source, demand of a high degree of association from the reader). Very little has been done in the literary analysis of information quantity measurements within literary texts.

Transmission conditions (time and space, how when and where the book or text is read) were believed to be a passive process, mostly involving the basic skills of literacy such as recognition of words, their perception and understanding them in the grammatic sense. This is only partially true, when transmission of information occurs over a longer period of time. During a short reading time content elements may prevail, during longer time, formal ones. If perception of an artwork (book) is dispersed widely over time and space (over several generations or in different cultural zones), the same text may have a different aesthetic information impact.

Readers repeatedly exposed to similar contents or forms of literature very often form stylistic, cognitive or formal stereotypes or archetypes specific to cultures, centuries, or transmission medium. But certain stereotyped or archetyped texts may not be understood in the same way by a reader of another culture or century.

A quantity of information, its structure or succession perceived, is not the same as in the information source. It may be, and generally in most reader's cases is, diametrically different. Actually, only a minor information quantity from the text is stored in the human memory. The brain of a skilled reader learns quickly to retain only minimal contextual or formal cues from the book or text perceived.

During the reading, other mental processes are catalyzed, memories retrieved, situations imagined, psychodramatically experienced, etc. In this sense, we witness the literary text information impact. This can provoke the reader's response, either a latent one (i.e. thinking about the story, characters, etc.) or a pronounced, overt one (talking about the text with friends, modelling one's own behaviour after fictional characters). The receiver's response may also be an information source for another information chain (in the case of literary criticism, a review or analysis).

Information chains exist in a certain time and space. There is a production time, transmission time and perceptual time for each literary text. Both production and perception time contain a high amount of meta-information processing (thoughts of the writer before the creation of the literary text; thoughts of the reader during and after reading the book). The transmission time is the actual reading time.

The literary text, as any other works of art, may be viewed from a biocybernetic viewpoint as an information cascade, in which one piece of information after another is processed in dense succession.

The literary text belongs to the horizontal, structural type of information cascade. This cascade is typified by the perceiver's relative freedom in processing information at his own pace and with his own selectivity. The

literary text has a higher level of information programming than any magazine or journal. The reader is expected to follow page after page, from the first chapter to the last, but nobody restricts him from skimming or skipping certain pages if he chooses.

More interesting phenomena occur with interrupted reading. Any time the reader interrupts the succession of words, the hierarchy of information just perceived undergoes changes - minor or substantial. This can enhance the aesthetical information impact of the text in some cases, so that the mind of the reader works further on information reprocessing (dreaming about content, relating the text to own memories or values) psychodramatic inclusion of reader into the book's story, etc.). But there are also interruptions which decrease the text's impact when the reader turns away from the text and its subject to other topics or activities. Still, such diversions can have a beneficial effect in the case of reading fatigue. Distraction becomes a welcomed rest and replenishment of energy in the cortical processes. The most disadvantageous interruptions of reading are those which occur when the flow of information from the text crosses another intense information flow, and both quanta compete in the cortex of the brain for simultaneous processing. The brain itself is capable of many simultaneous information flows in a fraction of a second, but input-output peripherics (senses, feedback, responses) are time consuming and substantially decrease the chances that the prior information will be processed at all. Such interruptions range from very minute ones to those lasting several hours or days. Even a small detour or a fixed gaze in a different direction or dialogue exchanged while reading may change the information impact of the text. But if the interruption ends within the range of the short-term memory processing time (around 40 seconds), the original information

flow can be restored quickly and without too much delay. With longer interruption it can last several minutes before the original information flow continues, but it is always fragmented and incomplete.

The important influence of information environment is an indirect one. Nowadays, the reading of texts, constitutes relatively leisurely information impact in terms of pace. Other information inputs occur with higher intensity and frequency (films, radio, and television programs, car, train and air trips through landscapes and cities; the contemporary city itself with its rich fast moving informational environment, multitude of shops and products to be perceived in a short time, etc.) the prevailing mode of perception then influences the reading of a text, leading to information skimming. Even if the information from the text is perceived fully, it occurs more and more within younger generations that processing of such information is only partial. Such an impact is not great on contemporary literature, which tries to adjust by fast-paced stories, quasi-film or television situation descriptions or the structure of dialogues. Significant difficulty occurs when an 18th century classic is read by a reader who is (consciously or unconsciously) in the 20th century reading and information processing mode. The result is partly partial or total misunderstanding of content, style or specific aesthetic value.

From ancient time all writers practised the strategy of "reader's motivation" - devoting the introduction of their literary work to careful, artful familiarization of the reader with the author's own flow of thoughts, styles of thinking, characters and [illegible] explanations. By force of this information process, an invisible bond links the reader and author, across centuries, generations, and cultures. This bond is strong in cases where the intensity and frequency of the reader's informational environment is slower than inside the text; it is weak or impossible to establish when a high intensity informational environment surrounds the reader, especially if the author

insists on tightly programmed progressions of storage or styles.

Interesting geneological and histological phenomena affect the perceptual time of the information cascade found in a (text, or book). For every human being, the perception of information occurs in slightly different routes and in different ways, from one text to another, and from one age to another. The young reader may read faster sequentially, but slower, contextually; the mature reader may process information from a literary text very quickly and in great depth; the old person may slow down the reading pace, and pause more often for meta-information reprocessing (dreaming, resting). Also, over the centuries, the perceptual time has changed little during the past 10-12-centuries, but the manner and speed with which we perceive the information from our environment has changed greatly. In the contemporary world, especially in America or Europe, the speed of human information processing is the fastest our civilization has ever known. While this would not mean that all information man perceives from the environment is perceived and duly processed, stored (some authors may label this mode as a "shallow mind"), it does suggest that we are living more than one "biological informational" life. And perhaps this fact is one of the underlying reasons for what has been called the "generation gap".

No wonder a son complains that his father cannot understand the young concept of life and ideas, especially if the father still intercepts, processes and stores information the same way his grandfather did. Our biometric studies suggest that the volume and intensity of information processing within the life span of a man in the second half of the 20th century is the equivalent of six or seven lifespans of information capacity of a person from the 14th or 15th century. It should be stressed, however, that the great difference in information quantities processed by the human brain during the lifetime in different

thoughts, carried by the information flow.

The complex of all habits and approaches toward information interception, processing and storage can be called the information spectrum of the reader. This also varies with time and space. Human environment, culture, history (traditions), greatly influence the way people perceive the world. Similar environments, cultures, traditions can group and adjust individual informatic modes into a more or less common way of intercepting, processing or storing information; these are called information stereotypes. If such a similar way of seeing things can be found in living or literary examples (in a situation, character, action), an information archetype emerges.

Sometimes, we deal (even in the same country) with "multilayered public of readers" - each layer with a different identification of content, time and place of information within the same literary text. The unity of text, content or style becomes undermined from the "reader's" side and the understanding of the text content or style becomes less meaningful for people with different perceptual stereotypes and spectrum. Sometimes opposite values are attached to the same content by different readers. In a wide range of diversified reader's public (by culture, geographic region or century) the literary text may in its own geneology impress its first impact on the reader via external formal parts (including layout, typographic impact). The readers close to the average or adjusted to the medium probably prefer the semantic impact of information (stemming from story, content of text) and the very skilled reader may concentrate on the aesthetic information impact with emphasis on internal formal parts of experience from reading the literary text.

In order to understand the basic processes in the human brain during the information interception, processing and storage, here are the basic logical constructs regarding the mechanism and processes of the human brain.

Sensoric information is processed in the human body by the brain which is composed of approximately a hundred billion cells. These cells are of two kinds: neurons which are the functional units; and glia which are filters of space but which have specific functions at certain times of brain activity. Each neuron has a cell body and connections called axons and dendrites (incoming and outgoing fibers). Between these bodies, and also between these connections, there are liquid gates called synapses in which the transfer of chemical and electrical activities are combined.

The number of neurons are more or less loosely inter-connected. The electrochemical activity of such neurons is called neuron circuit (which is of a temporary nature), and a neuron circuit is the basic unit for information processing in the human brain. The interrelated activity of neuron circuits is what is commonly referred to as "thinking". During this procedure, more can happen than mere energy transfer: the chemical properties of synaptic gates or neuron cell boides are slightly changed. These changes, which are more or less permanent, are the base of human memory. If the change occurs on the level of the synapsis or glia, a lower level of information unit can be stored. If, however, the change occurs in the cell bodies of a large area (a memory complex), then we store information patterns which, in turn, are capable of starting or influencing many future information transfers (ways of thinking). If the chemical change is durable and capable of influencing other parts of the brain on a similar level, then we are dealing with high stereotypes or skills. This process is close to our codes of "learning". If a whole structure of more or less permanent interconnected neuron circuits is created, we label this feature temporal neural pathway, which is the basic unit for the processing and storing of semantic information unit ("thought", "idea"). The borderline of such pathways create a resistance pattern in feedback to this process, which may direct future excitations or decays of pathways (our

notion of "value").

A single neuron circuit is not capable of processing such complex notions as a "tree" or "house". Instead, a multitude of neuron circuits are in operation, not only at the very moment when a person sees a tree, but also shortly thereafter, and the final fixation of memory is finsihed long after, within hours after the moment of perception. If a person receives several information units during a short time, neuron circuits may start to anticipate the further information impact before the actual input is received. When several neuron circuits are activitated form the sensoric input, the inner feedback mechanism not only further specifies the sensoric target (e.g. movement of the eye), but is also builds a very specific hierarchy of activities within the brain; therefore from the perception process, certain neuron circuits are left with higher energy potential than others. Energy transfer, then, is the transmission medium in the brain, and the sensitivity of neuron circuits represent the primary gate through which the transfer may or may not occur. The neuron circuits have a certain minimal energy level which can be increased or decreased metabolically or mentally. This "sensitivity" can also be changed due to the sensoric input causing later chemical changes.

There are basically two mechanisms of neural transfer in the human brain:

(1) Specific Transfer, where intensity of the incoming energy and characteristic (e.g. amplitude and time) determine the energy transfer. Usually, such transfers result in excitation and threshold changes of small groups of circuits within the cortical (and, rarely, the subcortical) regions of the brain. They propagate with high energy potentials through the neocortex, but may not excit the circuits with every different thresholds. Areas of the brain cortex within the parental lobes are likely to be influenced by such transfers. In such cases, the person refers to "rational thinking", "reasoning". This process is only faintly detectable on EEG records.

(2) Wave transfer: With certain sensoric or metabolic inputs, the incoming energy (of large volumes) can act as a catalyst for an avalanche of activities of many neuron circuits, regardless of their thresholds, but dependent on the proximity of the cortical (and often also the subcortical) regions. In such cases, the person reports "emotions", "feelings", "thinking by heart".

A combination of both mechanisms, which often occur in everyday life may bring certain mental stress to the person, but they do not yet constitute "aesthetic feelings". The processing, storage, and, namely, the reflection (feedback) of such processes back to the cortex make up the psychophysiological basis for what we refer to as "aesthetic feeling", or, in special cases, also notions of creativity, enlightenment, trance.

The combination of mechanisms does not occur often or easily. Usually, when the cortex is in the state of wave transfer, the intensive specific transfer is subdued. On the other hand, if a person employs specific transfer predominantly (rational thinking), subcortical activities are subdued.

Certain persons may have an inclination to certain modes of transfer. There is a difference between the sexes: women produce wave transfers more easily, or employ more subcortical regions of the brain during their lives. Men are commonly known to suffer earlier from deficiencies of specific transfers (senility) in old age. There are also certain differences in the combination of both mechanisms due to racial and cultural differences.

When input from sensors activates the neuron circuit, the information part is not only registered or retrieved, but something else remains in the human brain: any electrical activity slightly changes the substance made or reacted to by the cell. There are organic substances that are more susceptive toward electrical activity than others. In certain chemical configurations, this transfer may occur quickly or slowly, or not at all. The base of human memory

is probably a chemical one. The time axis in the human memory bears energetic characteristics.

The memory is not specific only to the human brain. There are other cells in our body which are capable of "memorizing" (genetical, immunological memory, etc.). What is specific to the brain memory is that the chemo-electrical retrieval is compressed in an unbelievable quantity and speed - both of which are capable of changing the stored information to an unkown extent.

There are three levels of memory in the human brain and sensors alike. The first level is the primary sensoric memory, or input memory: the human being has refined his sensors toward the results (oncoming signal) and not toward the input function. This memory is in action,when the human eye reads certain parts of a picture, a letter in printed work, one invisible frameof film.

The second level of memory is a short-term memory, or a primary capacity of neuron circuits. (This permits us to remember something like a telephone number just long enough to dial it). Such memory does not extend further than a time of 20-40 seconds, but depending on our daily usuage of this memory, time or quantity of bits stored can be extended manifold). The higher, more permanent storage is long-term memory. This memory results within minutes or hours from the moment of input, but can be still easily erased or interrupted (electrically, chemo-therapeutically or psychoanalytically). The build-up of such memory largely depends on the chemical properties present in the brain and in the body at that time. There is another, "more-than-long" semantic term memory (which builds in the brain), with features called temporal neural pathways - and this regulates a person's attitudes, values, judgments, moral, ethical codes of thinking, and (occasionally) behaviour.

The short term memory is characterized by high electrical activity in the neuron circuit. The long-term memory shows up in electrical measurements

1. The basic (metabolic) perceptual rhythm:

The human neural system has periods of high operational sensitivity, and periods, where due to the metabolic changes, the functions of systems or channels are slightly subdued.

2. The imposed perceptual rhythm:

The previously mentioned basic rhythm can be modulated due to the input of information from the information source or environment.

3. The stress (oscilated) perceptual rhythm:

When using catalysts in a piece of art, creating stress waves (emotional impacts), it can happen that the perceptual rhythm begins to be irregular, with returning irregularities during short periods. This creates a "bouncing" pattern, where the receiver fills the space with non-existent stimuli from his own imagination (meta-subliminal effect).

When the informational environment supplies the person with a lot of information in a short time, people begin to join them together. This joint information dialectically becomes of a new quality, and may have different content, form, and aesthetic impact. We call large amounts of such joint information information patterns.

The information pattern of a country, of a car, of women, and many others are also developing over time. With time, this pattern remains in the human memory, the specific parts of the pattern decay, leaving only the indispensible features of it. The simplified pattern is called perceptual stereotype. For evolving such a stereotype, a minimal amount of distinguishing signs are necessary, and a minimal amount of energy in the cortical neural system is used. Therefore, it becomes an "easy and comfortable way" of thinking and dealing with the informational environment (hence the great preference for stereotyped situation comedies in television). But in the same way, it becomes an important tool for the effectiveness of thinking and is often implemented by artists into

the bank (for example, in oval stones we can distinguish a human face, in a tree during a fog, a human posture, in a black dot on a highway, an automobile). Perceptual stereotype is, of course, still far from an "aesthetic stereotype".

When many information patterns exist in daily life, less individual content of their parts is perceived or stored in the memory. When several perceptual generations live in the same biological time, as in our time, this process can be viewed as shallowing of previous ideas, content, styles, themes. Therefore, it introduces the notion of a whole artistic field, media, which permits an easy information pattern transfer (television) and builds certain resistances toward media with low information pattern transfer (books).

When the information pattern is used for a longer time and is successfull in communication between people, it becomes a symbol. There is a particular way of identification, fixation and perception of symbols.

From the neurophysiological point of view, the formal and semantic parts of information are not processed in the brain very differently or on different places of the cortex. Usually, the information input from sensors carry formal and semantic parameters in the same time, simultaneously, and the division of such components may, or in many cases, may not happen.

It is a predominant function of the upper cortical regions to reprocess incoming signals from the cerebellum (sometimes at a very high speed, where we cannot label this process as real "feedback") before the first memory storages are attempted. The occasional byproduct of reprocessing may be reflected, and in this reflection, we differentiate the "form" and "content" of the artwork. Even the very highly developed human brain may often have difficulty making such distinctions. The long repeated sensoric input followed closely by abstractions may be needed in order to learn a greater ability for formal or semantic analysis of the artworks. Usually, semantic analysis may be a simpler task;

the simpler it is, the more the story, content of the artwork reflects the environmental realities of the observer. For formal analysis, there are no direct connections between the viewer's environment and his/her ability to distinguish the form or style of the artwork. Therefore, artifical learning is a necessity.

The analytic ability of the brain's cortex has not yet yielded the notion of "aesthetic impact".

The Aesthetical Impact of Literary Text on the Human Mind

In this chapter I would like to first deal with the notion of "aesthetic impact" in very general biocybernetic terms, as it applies to a literary text as well as to any other work of art; secondly, with the specificity of written, spoken or listened literary texts; and thirdly, I would like to analyze the aesthetical impact pertinent to major literary forms (drama, comedy, poetry, etc.)

There is a general uneasiness among biocybernetists or neurophysiologists, in defining the notion of "aesthetics". This caution derives from the fact that what is easily labelled in one word (although we may differ in opinion in what this word means), is a complicated, structured process in the human brain - in some cases coinciding with the word aesthetics - but in many other cases has very little resemblance with known speculative aesthetic theories, and has connections with other mental or metabolic processes.

Here are some phases of the mental process, which can influence the notion of "aesthetical impact":

1. There is no significant distinction on the sensoric level of incoming information between "aesthetic" and "non-aesthetic" information. Eyes scan painted artistic pictures or functional details of machine in a similar mode at first. Ears hear an unpleasant sound and harmonic chord similarly. This

similarity extends only to the microsecond range. Very early, by repeated process of reading the picture or words, or hearing the sound, a person applies multitude of different feedback searches specific to the perception of the artwork. The major importance, here, is the binary aspect of perception.

2. Recent research shows that there is little difference in the activity of cerebral cortex, when incoming signals from sensors are first processed in the brain. The cerebral cortex interacts or feedbacks only major physiological parameters of the art work (spectral changes of sound, color, geometry of space, differences in brightness and contrast, as well as typography of text and spacing information within the paragraph or on a page of a book). But here the artist has the first chance to significantly influence the delivery of the artwork's content, message. By composition of picture, musical piece, syntax of a literary statement, the succession of incoming information into the brain is more or less programmed in time, and in this way, further abstractions, processing of information and memory storages can be significantly influenced. Most "formists" among aestheticians pay attention to this part of the art perception process (Arnheim, Zettl) and describe the functions of formal parts of artworks on the human mind in great detail. But the actual impact of the artwork goes much further than to the function of the brain's cerebral cortex.

3. . The processing characteristics of the artwork vary significantly from the processing of functional information parts. At first, there is usually a rich combination of stresswave and specific transfers. This combination may have a very different time base and space configurations in the cortex. (1) It may start as stresswaves in the cortical level and fire specifically in the subcortical region (sometimes evoking motor responses, like laughter, blushing, movement of head, eyes, etc.); (2) It may start from the subcortical region and go to the cortical region with great delay (in cases when the artist employs pieces of reality, the receiver should act upon - like architectural piece,

landscape, dance); (3) It may be processed for a relatively long time (of several microseconds) exclusively on the specific firing base of the cortex, and then from shortterm memory, causing stresswaves in the cortical or subcortical regions.

Secondly, there is usually a high number of feedback searches: the person returns to the initial sensoric input many more times than the usual functional information processing (eye scan painting more times than a similar piece of reality, ears heighten the sensitivity toward small spectral changes of a tune), and these feedbacks should usually yield more new information (if the observer is not getting enough information input from subsequent searches, usually reports regarding the artwork as "dull", "cheap", "nothing in it", "not rich"...).

Thirdly, there is usually a very high activity of non-related cortical regions in subsequent time, especially when the first memory searches become apparent on the EEG record. We may suspect that the person is completing the artwork's perceptual input from his/her own memories, experiences, comparisons.

It should be clearly understood that although the final neural pathway ("idea", "art form") may be formed in certain parts of the brain's cortex, - during the processing of information also - other, unrelated parts of the brain are active.

The notion that pictures are processed on the right and words on the left hemispheres of the brain is only partially true. We only know that words or speech must yield activity on the left brain hemisphere, and whenever a picture with spacial components are perceived, the right hemisphere is surely active. The final fixations in memory can overlap in very different regions of the brain, and retrieval may not only employ the mentioned single hemisphere, but the whole brain's cortex.

4. Somewhere between the processing of information form the perceived

artwork and long-term memory storage, a process we may associate with "aesthetic" notion occurs.

By processing of information in the cortex, not only is the incoming information energy active, but also the inner part of the cortex, which is in a state of constant action (during waking hours). The reflection of the processed information from the artwork on the remaining certain part of the cortex are a source of "aesthetic" notion. Recent research shows that this "certain part" of the cortex is very often in the frontal area of the brain, parental lobe. Generally, it is believed that the major function of the cortical area in the parental lobes is one of combinatory thinking (when a person is involved in mathematical games, chess playing or counting - high activity in the cortical regions of parental lobes are quickly erupting and ceasing). By the functional disruptions of this area (due to accidents), a person loses most of his ability to judge or reason, also the ability to distinguish between "beautiful" and "ugly". But we should not localize the "aesthetical spot" on the brain's cortex in an Aristotelian way - the parental lobe region is only one of the necessary mechanisms for acknowledging the "aesthetical value" of the artwork. Without the preceding processing or input characteristic the speculative action of the parental lobe may not yield any notion of aesthetical character.

Basically, this part of the neural process is similar to the rational abstract thinking, but works with neural energy material of a very different character (predominantly fusions of stresswaves and specific firings of neuron circuits). This is the reason why "aesthetics"is sometimes labelled as the "science of art" or the "science of beauty".

5. There is a certain "by-product" of "aesthetical acknowledging" of the stored information in long-term memory. When information is sotred (chemically), there remains a certain lowered threshold characteristics on the number of neuron circuits, giving the possibility for further similar signals to pass faster and easier through the cortex of the brain. The surrounding circuits, in opposition, create the "barrier", "borderline" with higher threshold characteristics. The same process occurs with the reflections from the parental lobe (and occasionally from other parts of the neocortex), containing this notion of "aesthetical acknowledging", or from subcortical regions ("aesthetical feelings") - so in this way the notion of "aesthetical value" may be stored in the human memory. By repeated storages and retrievals of comparative information units, a person is trained in "aesthetical taste". This process is nearly invisible in normal human behaviour of a person, but shows significant differences biometric scanning of a person's responses to the perception of artworks or even realities. Aesthetically trained readers read a text completely differently and may retrieve a vastly different form and content of the messages from the book, than laymen-readers. The professor of art history may see a vastly different world of various impacts in a classical painting than the guard in the same museum, despite his manifold experiences (daily exposure to famous paintings) from the same art work. The artist may retrieve from the artwork (own or others) stimulators of unbelievable power and extend.

It should be noted that this "aesthetical impact" (which occurs in repeated "aesthetical acknowledging" or "feelings"), may have its origin in one or all three major parts of the information chain:

- it can originate from the work itself;
- it can originate from the environment, under which the art is intercepted;
- it can originate in the viewer, observer and his/her past experiences, memories or systems of thinking.

Among are aestheticians and historians, the aesthetic impact of the artwork itself is most understood. The environment and meta-viewer aesthetic impact is much less explored.

A simple distinction of artwork from the environment (frame of painting, darkroom of theatre auditorium, silence before a concert) creates the first major environmental influence. The neurophysiological impact of these lies in the major change in the sensitivity of neuron circuits to the incoming information impact (labelled as "anticipation"). The stripping of an artwork from surrounding realities is also clearing the sensoric input from noise. All art of typography and layouts is based on this influence. Only in exceptional cases, is the "noise" welcomed, when either the information sources, artwork is too dense, too overfilled with information units (surrounding of TV sets as a welcomed distraction) or where the perception of artworks may cause natural fatigue of the observer (peaceful looks into a garden from the gallery with many paintings). But there is more than the immediate environment of artwork: the environment extended in space and time, and projected back into the artwork as the viewer's perceptual cultural and mental stereotypes and archetypes which are invisibly influencing the molding of "aesthetical values" in the observer. There are very well known attempts to programme preceding and succeeding time or space segments around the artwork. The very sophisticated programming of space and time is visible in the churches, palaces or urban settlements known to nearly every civilization and culture.

A very peculiar situation occurs if we cross the time/space axis of

the environment: (we exhibit Roman sculpture in 20th century buildings or read medieval books in a modern library, or hear Renaissance music from the radio). Then the environment may add or counteract to the original aesthetical impact. The same situation may occur with the temporal axis: (We present several views of a Roman temple via shots in a film or television programme or via a few photographs on pages of a book).

The origin of an aesthetical impact caused by the viewer (observer) is a rare case. It needs to have a person who has previous knowledge, aesthetical trials, education, that he/she can substantially add to the artworks seen or otherwise perceived.

But these cases may also occur accidentally when a person has certain strong memories, attachements or sentiments to content or form of a specific, single artwork. In the past, such cases lead to the acquisition, stealing or destroying of artworks. In rare cases, "maniac attachment" may have its origin in exceptionally high aesthetical feelings (probably never the cause of aesthetical impact or acknowledgment).

If the final construct is of: (1) Direct (2) Substituted and (3) Projected origin, there is a difference in aesthetical impact. in the case of direct origin, this occurs when a person observes the artwork directly from the original, and forms and aesthetical feeling, acknowledgement or value on the basis of its observation. Substituted origin refers to a case when somebody or something else (book, review, filmed or television programme) reports on or about the artwork, performance. Here the skill, mental (editing) and technological (camera's point of view) manipulation may influence the final aesthetical construct of the observer.

There are several helping or adjoint processes in the human brain which substantially influence, speed up, delay or change the aesthetical notions:

1. The depth stresswave:

In certain cases of information input from the read book into the human brain, the stresswave (emotion) may burst over several layers of the cortex and subcortical regions quickly and simultaneously (hypothalamus) or recticular formation). Reflection in this case in the upper cortical regions may evoke a notion close to the term "beauty". This notion can be inherent to many cases, only some of them associated with aesthetic feeling. So the classification or acknowledgment of beauty alone is not always close to the aesthetic, but significantly enhances possible aesthetical feelings, acknowledgements or values.

2. The "overlapped overload":

When information is incoming in the cortical region, usually the brain works inside the cortex much faster than the input. Therefore, certain regions already have a lowered sensitivity or neuron circuits for the input, others may set "barriers". We call such processes "anticipation" or "forecasting" (of a story, event, process of perception of an artwork). But the author of a play or book may use an unexpected turn, situation, color, musical tune. The input falls into the wrong neuron circuits, causing high resistance, stresswaves, blocking of neural pathways. But the brain re-adjusts quickly and follows new pathways. The remaining cortical or subcortical reflections of resistance are called "surprises".

Such a mechanism can be an important trigger to the conjunctions of specific firing and stresswaves, together originating the aesthetical impact of the piece. Usually, in this way, artists reach this expected goal much easier, than by the regular building of formal or theme domains. There is a very important fact of the "after-effect" of an overload. Surprise must be "cooled-off", in order that the brain may resume the normal rhythm and process

rhythm - which alone is a very powerful artistic tool - but in the final impact, lowers the sensitivity of the viewer, observer to the semantic part of the artwork's information.

3. The "imposed" information cascade:

The artist models the perceptual process of the artwork in the artwork itself. (By subjective camera, by a text of a book, the author "discovers" with the viewer or reader the space of the scene, the situation). In these cases, the observer is willing in most cases to "be privileged to be with the author, to flow with the show..." - and model his own perceptual process on the author's. The imposed cascade may sometimes cause psychotic or persuasive results (Eisentein's filmic rapid montage), where the viewer temporarily changes his own beliefs, values, aesthetical judgments. But the effect of an imposed information cascade is of short duration, and ceases within a few minutes after the artwork's perception ends.

4. The "stimulator" impact:

Here the artwork serves only as a very minute initial input, usually of a formal nature, and the viewer, observer follows the perception in loops, occasionally returning to the initial artwork, but mostly performing his own mental variants, of the theme, of the forms, of the dreams. Most of the religious artworks, or many abstract paintings, are of this nature.

A specific case is the case of poetry and music, where stimulators are highly and frequently used. Here we distinguish programmed stimulators (most of the theme's music or poetry "with the meanings of words"), and stimulator envelopes (disco music, dada poetry). In the first case, the higher cortical functions are in operation, in the second case, the cerebellum or only parts of the left brain's hemisphere, like Wernicke Centrum are mostly in operation.

The neurocybernetic view of aesthetics can be summed up as such:

1. The notion of aesthetics is a complicated system of neural reflections within the cortex of the human brain. It may or may not need an external sensoric input which serves either as a stimulator or delivers certain content, messages from pieces of realities to the hierarchy of stereotypes and archetypes.

2. Aesthetic impact has a characteristic of temporal neural pathways (similar to any "thought" or "idea"), but what is retained in the long-term memory of the cortex is not the pathway, but its by-product, borderline resistance of surrounded areas. This resistance is not permanent, but changes more slowly than other neural pathways, and arises more slowly.

3. This feature is not inborn and must be learned by human beings during repeated experiences, but such learning is very slow, difficult and, in many cases, impossible.

4. The process of aesthetical impact varies significantly from person to person, across cultures and history.

5. The first level of reflection (lowest one) can be called "aesthetical feeling"; the higher, more complicated, "aesthetical acknowledgement or appreciation"; the most permanent and highest process can be called "aesthetical value".

6. Besides the basic process of neural reflections in the human cortex of the brain, there are many other helping mechanisms which work when we use the adjoint term "aesthetic". In this category, belong the notions of "beauty", "surprises", "anticipation" or "stimulation". Although differently labelled in language, neurophysiologically works simultaneously and supports the basic "aesthetic" reflective process.

Aesthetical Information Profile of Literary Text

The biometric follow-up of the cortical processes during and after the reading of a literary text, graphically or digitally represented, can be called the aesthetical information profile of the literary text.

There are a few basic notions to be observed before any diagnostic interpretations of biometric data can begin.

1. Cortical processes in the brain occur simultaneously in a large interference neuronal network, therefore we can imagine it as a three-dimensional spacial field of activity. Biometric electrodes extract electrical potentials within two or more points of this field. Therefore, we are never able to register the full potential of the impact in a given time segment. But on the other hand, any potential extracted in this way is a document of a much larger process going on in the cortex.

2. It must be clear that each profile biometrically extracted is highly specific to a particular reader and the particular time of the test. I seriously warn anyone who wishes to generalize such findings by trivial arithmetic or social statistic methods. There is nos uch notion in biometry as the "average reader" or the "median impact". Each reader must be treated as an original, an individual. We may even extract different biometric profiles of the texts from the same person at different times.

This notion, although uneasy to the most exact sciences and statistics, corresponds to the well-known experience that the same book can be read with different levels of appreciation at different times.

3. The key question for diagnosis of biometric profile is an immediate preliminery assessment of basic biometric parameters of the reader. This is called a pre-test. It consists of a series of simple stimuli on which the aesthetical information impact is known, and therefore, instrumentation can be adjusted so that any further information impact is readable. Some

people produce very faint responses, but have a high impact in text-reading; other large excitations are acutally a very mild impact. The pre-test comprises a further correlation - comparative mask for reduction or enhancement of the subsequent biometric data, extracted during a reading of the literary text.

4. Although most processes during and after the reading of a literary text occur in the cortical regions of the brain, there are very important effects of such processes extended into the subcortical regions or to the peripheral neural system of the body. It is very difficult to reach regions deeper into the brain or processes beyond the speed of 1/80th of a second with existing biometric technology. It is much easier to reach such an impact indirectly (via ECG, GSR, BSR, EMG). But by registering such indirect responses, one must be aware of time delays of different processes. Both may cloud the original cortical impact. Similar pre-tests are a must by such registration. Data from pre-tests are important correadings, completing a comparative mask for further reading of a biometric profile.

5. It must be clear that what we get in the aesthetical information profile of literary text, is only the primary information impact; the one arising during and shortly after the reading of the text. Any secondary thoughts, imaginations or psychodramatic processes are excluded and any biometric registration of these is highly questionable. We must be aware that present technology enables us to detect only major energetic changes, not the latent states. The most advanced instrumentation is oriented for the detection of electrical potentials, but from biocybernetic studies we know that the changes of electrical potentials in neuronal networks represent only a minor and minute phase. Much longer and much more significant are chemical changes, but the technology of detection (chemospetrography) is still in the stage of inital development.

Instrumentation:

For composition of the biometric laboratory for testing of literary texts, a few basic apparatus are necessary:

1. Sensoric tracking device

Here we consider the primary visual tracking and the secondary aural tracking. For visual tracking, a variety of electro-oculographic devices are available on the market. The simplest are tachistoscopes, but they create uncomfortable dissection of the text, and there is substantial fatigue involved by prolonged testing. The oculograph and electro-oculograph are more advanced machines and are commonly known as eye-movement machines. Probably one should say here that the machine with precise paper registration or digital data storage is better for our purposes than those involving registration via a photographic or videotape mode.

The most suitable are combinations of electro-oculographs with electro-retinographs when the response of the direction (eye movement) is inter-coorelated with retinal response. Here we have a real "information impact" measure, detected in the very same moments when visual stimuli begins to work in the reader's body.

For very detailed analysis of literary texts, this device may be connected with an x-y-plotter so detection of reading may be done up to the detail of a single syllable or even letter.

For research experimentation here, a machine type Eye-trac, Mark IV, adjusted for ERG reading with x-y plotter and alternate digital processing output to the PDP 11/25 computer disc memory storage was used.

2. Cortical Response processing device:

For extraction of cortical data responses, a clinical EEG (electroencephalograph) is used with appropriate graphical/digital registration output. Generally, 10 electrodes are in use simultaneously,

with the majority in the left hemisphere (Wernicke, Broca centres), control electrodes on cerebellum and in the parental lobes. In most cases, silver/silver-chloride electrodes give satisfactory results. In some cases (abundant hair), barium/lithium electrodes are better, but give out a lot of unwanted noise due to the high sensitivity. There is really no necessity to run separate multitrack EEG, if careful multiplexing of signals is used.

In our case, 5 track EEG was used, with SSCH and Harrison BL electrodes.

3. Peripheral responses processing device:

Here we use mainly ECG (Electrocardiograph), GSR (Galvanic skin response), and occasionally, BSR (Basal skin response) and EMG (Electromyograph). The major importance of peripheral apparatus in one of control channels. ECG is effective mainly in the subcortical reflexes to the changes of osmotic blood pressure (and as such confirms the stress-wave process in the cortex - usually associated with the reflection of "emotions" GSR channel is one of the controls with a very slow, but vivid reaction to the major attitudinal, semantic characteristic of the text. BSR channel has its value in specific reactions very often associated with poetic or paraphrased form of a text and EMG channel process responses close to the modelling characteristic of the text.

It is very useful to run peripheral channels in close timing with others, possible on multi-channel polygraph or digital processor, so the verifying procedure is simplified.

Biometric Test Methodology Protocol:

a. Preparation of test subjects -

Following are rules for test subject selection:

1. Test subject should agree voluntarily to undertake the test measurements, and sign the release, at least a week before the first test is performed.
2. By oral questions, brief medical check-up is made. The pathological and retarded cases are excluded form test audience sample. Histology of each case is recorded in confidential folder.
3. The aim of research, method of research and instrumentation of test is explained thoroughly to each person so that possible fear and stage fright against laboratory environment is avoided. If in this stage difficulty occurs, such a subject should be excluded from testing.

b. Test performance -

Those are necessary parts of each test made:

1. Input pre-test: For each input channel, following pre-test should be made: range intensity, range contrast, range field. The ranges of visual or audio perception should be aligned with the ranges of the input insturment record. The zero stage should be aligned with no-input state.
2. Processing pre-test: For EEC and EKG channel, range of recording should be aligned with basic binar response of subject (open-close for visual, sound-no-sound for audio). For GSR and EMG channel the verbal direction to desired or non-desired state should be aligned with range of recording.

For both pre-tests, several repetitions within a close time range are necessary. The reading should be identical on at least three following recordings.

3. First test run: Within short span of time, following both pre-test (approx. 2 min.), the first run of test collection should be made, on multiple channel recordings. Test run should contain also the time spans between the stimuli exhibition with overlaps or incidental processing.

4. Oral check-up: Right after the first test run, a short oral-check-up should be made, with reference to the registered reactions. Most of the question should be geared to the parts of the test run, where either non-aligned recordings occurred, or where a significant reaction was obtained. The reason for oral check-up is to eliminate a possible side-effects (motoric reactions, metabolic reactions, etc.) non-related to the exhibited stimuli.

5. Second test run: Approximately after 10 minutes from previous stage, a second test run should be made, preceeded by both pre-tests, once more made. On the second test run, the instrumentation should be aligned as close as possible to the parameters of the test run No. 1. All differences should be marked on pre-test (adjustment of potentiometers, follow-up of samples). Special attention on the second test run should be devoted to the areas of high reactions (information domains), and in this case a high speed of recording should be adjusted.

6. Marking stage: After the test is completed, the researcher should go over with the test subjects, showing him/her the test results, asking questions in order to verify the test results.
   Test should be cleared of the accidental results (instrumentation or operational mistakes), and the areas of high intensity results should be marked by envelope curves. Slide rules should be used for alignment of time log for channel interactions.

c. Test diagnosis -

Following are the basic rules for biometric tests diagnosis:

In input area -

a. general activity characteristics:

When looking on eye-trac or audiospectrographic (phonographic) recording, the overall activity pattern should be easily visible. In both cases, the quantity of fixations give us an indication of quantitative level of information input.

b. information domain characteristic:

Whenever a dense, short fixations period is occurring, cummulating within a few seconds range many fixations, and this period is followed by long, but sharply distinguished fixations, there is high probability of information domain interception. Such an occurrence could be easily checked up in X-Y plotting of image or reading of notation (in musical score).

c. input sotreage periods:

There are visible marks on each input recording, when activity of sensor is temporarily decreased for short amount time, periodically. In visual tracking, this could correspond with muscular activity of eye (blinking for example), but is not necessarily dependant on physical activities of the eye. The sign has a typical V characteristics of various amplitude. The slip should have always more than 30^{o} angle and should not be delayed for more than 2/10 of second. It is on the lower border of persistence of vision (1/6 of second). In audio tracking, the slip could last even longer. Input storage periods signify the renewal of optical (visual reading periods, from where the sensor departs on new and

d. Basic media characteristics -

Intensity, contrast, colour and movement are basic media, intercepted by eye. Each of these leave a distinctive pattern on the biometric record. Intensity is related to the amplitude of recording. Contrast to the length of fixations. Colours produce the various lengths of fixations (shorther wavelengths, shorter: orange, red; longer wavelengths, longer: blue; the longest fixations are produced by the wavelength around 500-560 mmc, yellow-green area).

Movement produces the distinctive marks of slips on recording. More fluent is the slip, faster is the movement inside the image or image itself.

In processing and storage area:

In this case, we are working with system (brain neocortex), which is in relative state of constant activity. We must distinguish the bio-perceptual rhythmical patterns from processing, storage and search patterns; the metabolical patterns from specific neural circuitry patterns, and specific excitations on part of neocortex from stress wave excitations.

a. general activity characteristics:

When looking on multi-channel recording, the overall activity pattern is visible in variations of amplitudes, differing sharply from rhythmical bioperceptual patterns, which could be aligned with short time distance (to 1.5 sec.) with input perceptual stimuli. The activity points could have a various amplitude and various time of durations, could be overlapped or could cease the activity pattern, not depending on the duration of initial stimuli.

b. storage pattern:

Storage pattern could be spotted on multi-channel recording (mostly on EEC channel), with characteristic triangle recording. After

initial excitation the amplitude diminishes gradually, ending on different recording from biological rhythm, and similar to the initial excitation record. When high speed is used, the slow change from stored to the biological rhythm information processing.(Biochemical chain) can also be spotted.

c. search pattern:

When several high excitation peaks occurr within the range of 0.5-1.6 second, it is a high probability that an intensive search is happening within a close range in the neocortex. The search may or may not result in the storage pattern. In most of these cases, the bio-rhythm after the search shows distinctive difference, if any storage had resulted from search or not.

d. stress wave pattern:

There are basically two kinds of stress wave indications: on EEC channel, it is a gradually increasing amplitude within a range of second, creating the vivid triangle shape of signal. The end of triangle usually ends in longer activity on high amplitude. The second indication is usually visible on EGK channel: it is a high variation of envelope curve (excluding the spikes of bio-rhythm at EKG). These two variants (EEC and EKG) have specific co-incidence: if EKG perceeds in stress wave EEC, subjects are inclined to cause the rational thinking as a beginning of stress wave state.

In both areas (input and processing) the decay of activity or decrease of neural functions (fatigue) could be similar. The differences could be discovered either by:

a. increasing the amplification of signal: in this case, biological

rhythm will produce vivid large periodic pattern;

b. increasing of the speed of recording: in this case, shapes of signal will be repeated with great similarities.

VI. Specific Tests:

1. Pre-test

This test belongs to the general preparation of all following tests, should be done immediately before test runs. Is aimed to the delimitation of sensoric field, delimitation of reaction time, processing abilities of subject, search abilities, storage occurrencies. In the diagnosis, not the isolate curve or fixation, but the cover curve is significant.

2. General readability test

This test is aimed to the general information input, processing and storage. Envelope curves are most important indicators, as well as high amplitudes areas and dense excitation peak areas.

3. Decision/selection test

This test consists of high speed sectional test run of the stimuli part, where in general readability test either high excitation or dense high amplitude excitation had happened. The diagnosis of the test should reveal the structure and characteristic of information domain. It could also reveal the direct or cummulative impact within information cascade.

4. Basic media tests (colour, movement, shape)

Each of these tests consists of comparative reading of input channel plotted towards a specific characteristics of stimuli (picture). The occurrencies within the basic media become visible, when specific plotted information part is changed, or parameters of input are

changed. The registration received is compared with general readability test.

5. General processing test

In this test multi-channel biometric tracking is used, with EEC channel in basic operation, and sensoric tracking (ev. EKG), as supplementary time log tracks, EEC channel is then leading in diagnosis. If only binary decision are sought, event recorded is plugged on EEC channel.

6. Stress wave test

In this test we are searching for stress wave development during the processing of information. It consists of sensory input tracking, (ev. plotting), EEC channel and in time synchron the EKG channel, with electordes following the small circulation circuit, ground on chest. The stress wave becomes immediately visible on EKG channel, within the 1-2 second range from input. The intensity of recording will highly vary from person to person. The length of impact could cease within few seconds, or could have characteristics rhythmical prolonged duration (bouncing wave).

7. Reaction test

There are three kinds of reaction tests: general (positive-negative, with zero in the centre of registration), negative (resistance test), and positive (action test). General reaction test consists of GSR channel as leading one, with sensory tracking and EEC as complementary channel. Negative (resistance) test is done with combination of GSR and EEC channel. Positive (action) test is done with GSR as leading channel and multiplexing of EEC and EKG for precise time log. In all the reaction tests it should be important that the pre-test, showing the person's reaction attitude is leading key to the diagnosis. By

different person, the peaks of GSR recording could belong to different stimuli. In all the cases EEC record should be consulted, before final diagnostic decision is made

Testing Methodology Remarks:

1. Technical Pre-testing:

The testing period is preceded by a short series of pre-tests. Each machine is first separately wired, adjusted and attuned to the test subject. Then the apparatus are inter-correlated to each other (sensitivity, range, attenuation) and to the tested person. No text is used during the pre-test period, only an empty card, ranges, places where the text will appear.

2. Programmed Pre-testing:

Here, a short sample of another literary text is used (2-3 sentences) in the same typography and same language to assure that the system is working properly. The results of the technical test are immediately compared with the recording and necessary re-adjustments are made. After that, the first major test should be run no later than forty seconds afterwards.

3. General Readability Test:

This is a straight multi-channel biometric test run where the tested person reads the text segment at his own pace. No conditioning or adjustments are made from the pre-test period. A short diagnosis follows afterwards and very soon the Decision/Selection test is run.

4. Decision/Selection Test:

This reading is limited only to those parts of the text where profound reactions were extracted during the general readability. The reason is to detach the cumulative impact of the information test cascade from the impact of the information domains.

After these two basic tests, a number of specific testings can be made with emphasis either on media carrier (print, typography, illustrations) or on individual biometric channels (emotional impact, reactivity, semantic impact, etc.).

Diagnostic Remarks:

Interpretation of biometric recording is not an easy task. What we get from the graphic or digital record is, in fact, a mechanical quantization of the dynamic biological process. Therefore, it must be clear that any change of biometric potential (spike) may mean very little in the overall diagnostic decision. More important will be the envelope curves of activities and specific patterns of activities. The individual high amplitude spikes may not be important - unless they occur periodically.

The search for specific patterns should start in the pre-test of the person. Slight irregularities, delays in reactions to stimuli, or asymetric registration (of symetric stimuli) may later determine the specificity of the pattern. The processing and memory patterns are not visible on an EEC, and reaction excitation pattern on an ECG, and reaction pattern on an GSR. Furthermore, their shape and durations are individually different from reader to reader.

A special kind of pattern gives an inter-channel comaprative pattern, which is closest to what we may label as the origin of aesthetical information impact. But its recognition and diagnosis depends on careful comparison with the pre-test of the person. control channels and the test alone.

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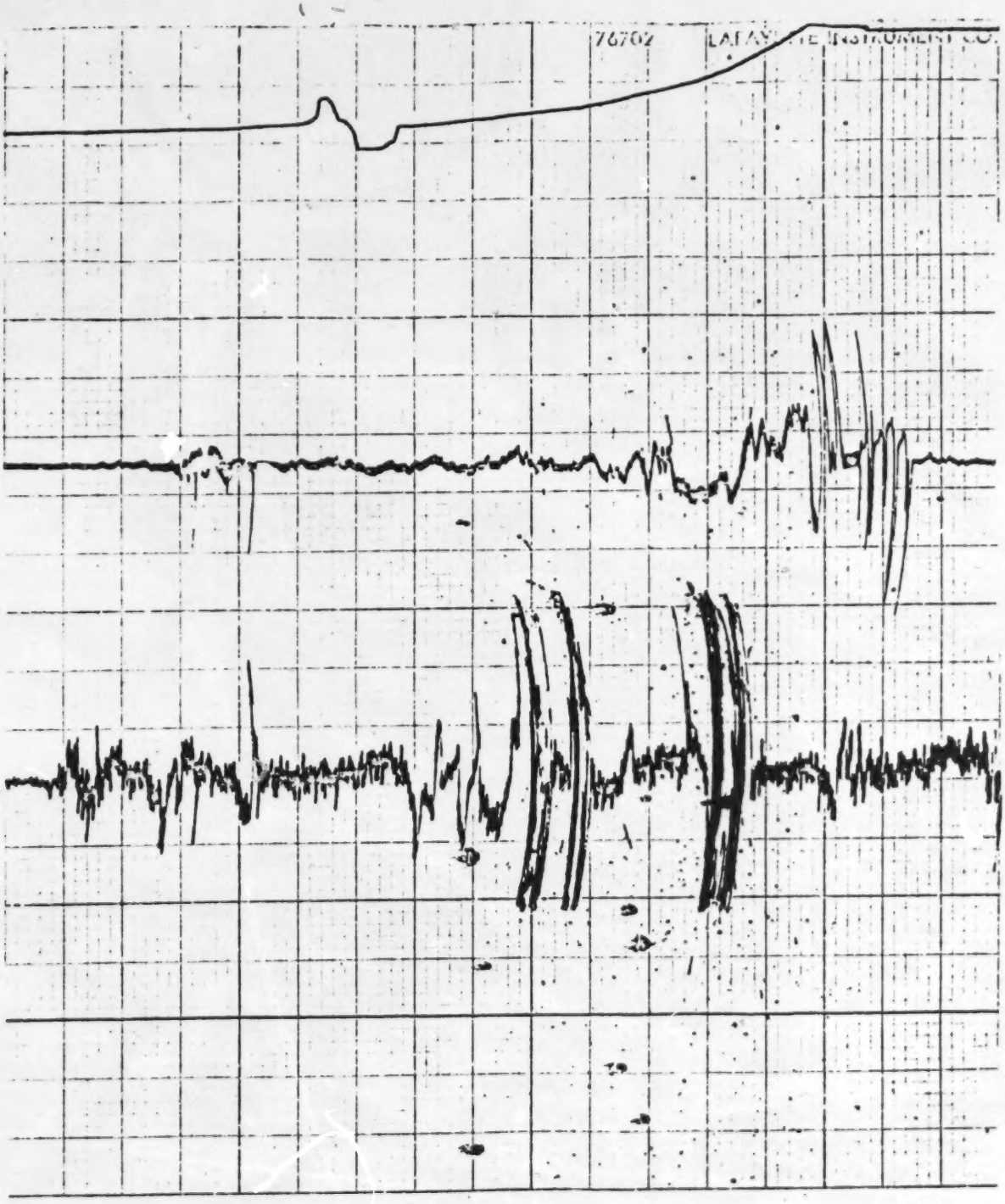
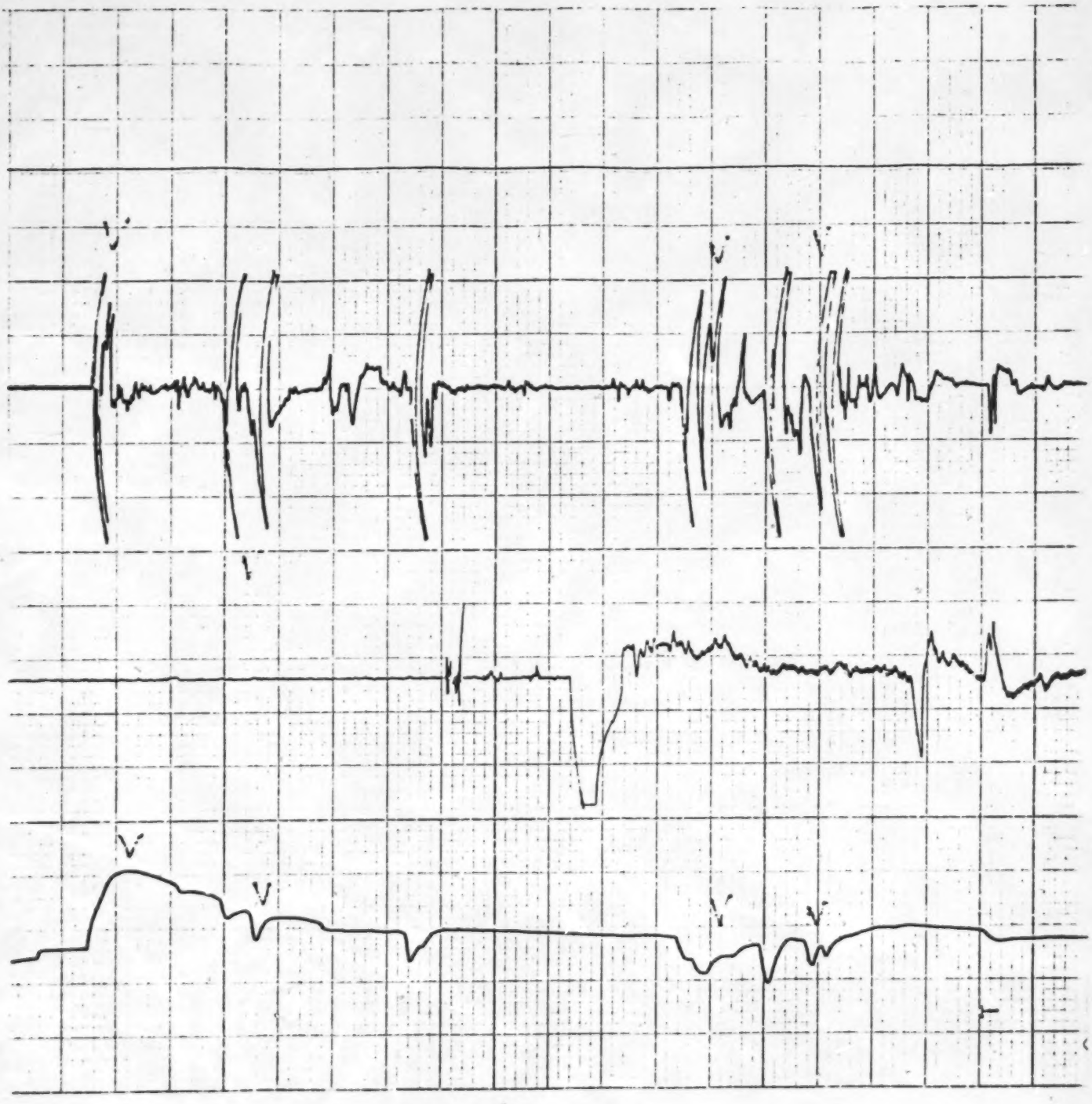
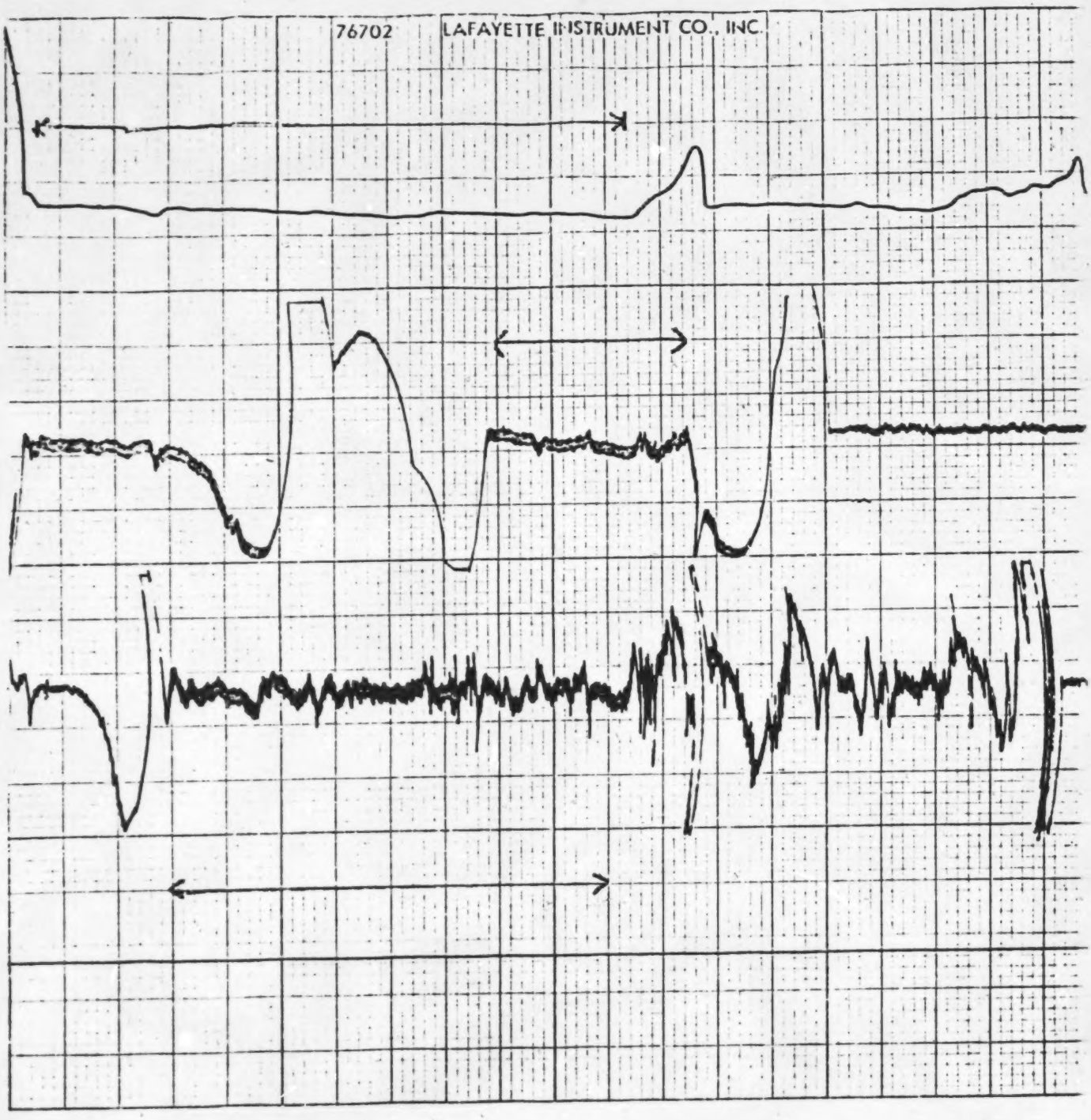
...ple of multichannel biotelemetric recording:



Overlaps of information cascade:



Information Channel Preferences:



Picture of mask for heterogenous tracking